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Improved Earthquake Safety for the Wasatch Front

FEMA Rates Earthquake Losses in "HAZUS99 Estimated Annualized Earthquake Losses for the United States"

HAZUS99 Estimated Annualized Earthquake Losses for the United States is a September 2000 report by the Federal Emergency Management Agency (FEMA) that ranks Utah seventh in the Nation for absolute earthquake risk and sixth for relative risk among the fifty states.

Ordering of States by Annualized Earthquake Loss (AEL)

Order	State	AEL (x\$1,000)
1	California	3,261,751
2	Washington	227,860
3	Oregon	167,496
4	New York	83,987
5	Nevada	55,041
6	Tennessee	52,117
7	Utah	51,448
8	Alaska	42,353
9	South Carolina	41,812
10	New Jersey	38,655

See page 3 for more of AEL/AELR rankings

Relative risk is the ratio of the annual average earthquake loss to the replacement value of building inventory.

HAZUS99 reports an estimated economic loss for Utah buildings of \$51.5 million per year. The loss reported is an estimate averaged over time including repairs, rebuilding of structures and the loss of content. Estimates are conservative because they don't include damage or loss to critical facilities, transportation, utility lifelines and the impact of indirect economic loss.

"It's clear we're playing Russian roulette with stored-up earthquake energy."

Salt Lake City ranked 14th among major metropolitan areas with an estimated \$39.5 million in annualized earthquake losses. A study reported by the Applied Technology Council in 1997 estimates a direct economic loss to Salt Lake City of \$12 billion in the case of a nearby magnitude 7.5 earthquake.

Will we see a magnitude 7.5 earthquake along the Wasatch fault in our lifetime?

see HAZUS99 page 2

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CUREe-Bylaws Adopted to Create National Membership

By a near-unanimous vote of the membership of California Universities for Research in Earthquake Engineering (CUREe), a fundamental change in the bylaws has been made to allow universities across the country to apply for membership. The name of the re-organized non-profit corporation is Consortium of Universities for Research in Earthquake Engineering (CUREE).

CUREE retains the prime purpose of developing and utilizing the capabilities of faculty and other resources at the engineering schools of research universities, applying those resources to the subject of earthquakes and thereby producing public benefits in terms of research, education and implementation of earthquake risk reduction. University and individual faculty applications for membership are now actively solicited.

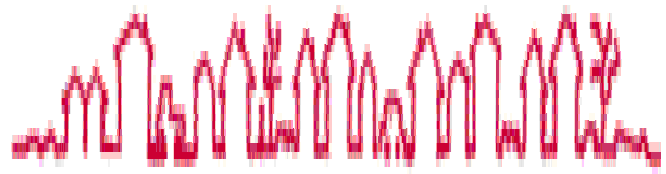
CUREE conducted large-scale, multi-university research projects such as the CUREE-Kajima Joint Research Program over the past decade, organized the NEHRP-sponsored national conference and workshop on the Northridge Earthquake and is currently conducting the CUREE-Caltech Woodframe Project in which practicing engineers, building officials and other potential users are actively involved. CUREE also participated in the recently concluded SAC Steel Project with SEAOC and ATC.

Geologic Hazards Of Utah

HAZUS99 cont.

According to geologists, the chance is between 5 and 25 percent in 100 years. Large earthquakes occur along the Wasatch Fault nearly once every 350 years between Brigham City and Nephi.

"In either case, it's clear that we're playing Russian roulette with stored-up earthquake energy on the Wasatch fault and other active faults in Utah," said Walter Arabasz.



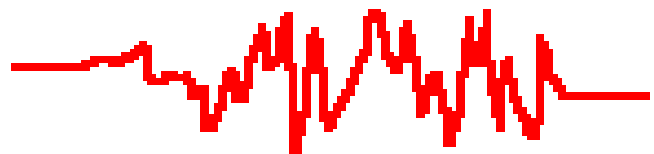
Conference April 12-13, 2001

The Utah section of the Association of Engineering Geologists, Utah Geotechnical Group of the American Society of Civil Engineers (ASCE), Utah Geological Survey (UGS), Utah Geological Association (UGA) and Utah Seismic Safety Commission (USSC) are sponsoring a conference on geologic hazards in Utah April 12-13 in Salt Lake City, Utah.

The conference targets practicing professional geologists and engineers and will highlight the latest techniques in geologic hazards assessment and reduction. Land-use planners and regulators should also find it applicable to their roles in the permitting and development process.

Invited speakers will cover earthquake topics on April 12, including ground shaking, liquefaction, surface faulting and building code issues. On April 13, the emphasis will be on landslides, debris flows, rock falls, avalanches and dams. Each day will conclude with a panel discussion of the invited experts to address questions from the audience regarding technical issues as well as issues of acceptable risk.

The conference will be held at the State Office Building. Program, registration form and *see Geologic Hazards page 3*



*AEL/AELR Report cont.***Annualized Earthquake Loss (AEL) for Top 10 Metropolitan Areas with Greater Than \$10 Million**

Order	Metropolitan Area	AEL (\$M)
1	Los Angeles, CA	1069.0
2	Riverside, CA	356.7
3	Oakland, CA	348.7
4	San Francisco, CA	346.0
5	San Jose, CA	242.5
6	Orange, CA	214.4
7	Seattle, WA	128.4
8	San Diego, CA	127.5
9	Portland, OR	98.4
10	Ventura, CA	89.4

Ordering of Top 10 States by Annualized Earthquake Loss Ratio (AELR)

Order	State	AELR (\$ Per Million)
1	California	2,049
2	Alaska	1,165
3	Oregon	1,063
4	Washington	878
5	Nevada	835
6	Utah	792
7	Hawaii	581
8	Montana	365
9	South Carolina	319
10	New Mexico	274

Annualized Earthquake Loss Ratio (AELR) for Top 10 Metropolitan Areas

Order	Metropolitan Area	AELR (\$ Per Million)
1	San Francisco, CA	3,167.5
2	San Jose, CA	3,017.7
3	Oakland, CA	2,954.3
4	Eureka Area, CA	2,935.7
5	Hilo, HI	2,825.4
6	Ventura, CA	2,760.9
7	Riverside, CA	2,673.3
8	Santa Cruz, CA	2,628.9
9	Los Angeles, CA	2,299.0
10	Santa Rosa, CA	2,293.7

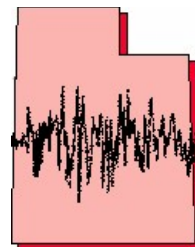
*Geologic Hazards cont.*

other information can be obtained at <http://www.users.qwest.net/~ssbartlett/geohazutah.htm>.

Conference chairs are David Simon (Simon-Bymaster, Inc.) for AEG and John Wallace (Intermountain GeoEnvironmental Services, Inc.) for ASCE. The organizing committee includes Bill Loughlin (AEG), Steve Bartlett (ASCE), Gary Christenson (UGS, USSC), Darlene Batatian (UGA) and David Marble (ASCE).

Registration fee is \$135 (\$75 one-day) and \$35 for students. Registration fee includes lunch, breaks and abstracts, and must be prepaid. No money can be accepted at the door. All announcements will be distributed by electronic media only, using AEG, ASCE and UGA email mailing lists. If you are not on any of these email lists or do not have email, contact John Wallace at (801) 521-1800 or Dave Simon at (801) 943-3100.

Disasters affect universities across the country. In the past decade, Stanford University



The Economic Benefits of a Disaster-Resistant University

Contributed by Bob Carey

and California State University, Northridge, were severely damaged by earthquakes; the University of North Dakota, Colorado State University, Syracuse University and many others have faced damage and business interruption from flooding. Universities are unique organizations that serve their communities and states, as well as repositories of significant federal economic and social investment. American progress is fueled by academic research results.

Annually, federal agencies fund about \$15 billion in university research. Much of the research is multiyear, and the value of ongoing research is obviously higher.

The Federal Emergency Management Agency (FEMA) and the University of California, Berkeley, have funded the research

"Federal agencies fund about \$15 billion annually in multi-year university research."

and development component of the Disaster Resistant Universities (DRU) initiative as the pilot for a national program. The DRU Initiative is intended to motivate and enable the nation's universities to manage their vulnerability to local hazards and to reduce their losses in foreseeable disasters. Beyond the primary need to protect students, staff and faculty, the DRU Initiative is designed to help universities safeguard their research capacities as well as the human capital associated with the academic environment.

On September 26, the Utah Museum of Natural History (UMNH) received the first recording of earthquake activity on newly

see University page 7

New Earthquake Exhibit at the Utah Museum of Natural History

installed seismograph equipment.

The exhibit, located in the museum's main lobby, is a partnership effort of the University of Utah's Seismograph Stations (UUSS), College of Mines and Earth Sciences and the EPICenter of the Utah Division of Comprehensive Emergency Management. The exhibit is being installed in three phases and includes plans for both science and public awareness/preparedness programs. Exhibit design testing is in progress to meet the completion date set for 2005-2006.

Construction of phase one is complete and contains a recording drum that receives information from three locations, two located in Utah and one in Yellowstone National Park. The UUSS network is the main link for data recording and educational training. Interpreted seismograms have been developed to teach UMNH and the general public interpretation techniques.

These techniques aid in the process of rapidly posting earthquake information, keeping the exhibit as

see Museum page 5



Museum cont.

"real-time" as possible within staffing limitations. Within the next month, one offsite station will be removed from service and UMNH will substitute a working connection to the seismometer housed in the exhibit. This connection will actively record vibrations as visitors use the stairway adjacent to the exhibit. Phase two will complete the installation of other information panels, such as a large, internally lit, interactive graphic panel to be added once the testing of the working seismometer is complete.

"This connection will actively record vibrations as visitors use the stairway adjacent to the exhibit."

Phase three includes development of a computer-based information system and touch screen. This will help facilitate reaching the goal of creating an interactive exhibit made possible by new Seismic/Eruption software recently developed by IRIS. A Web page connection, such as the EPICenter and UUSS, will be used as an information site for local interest. This phase will also include educational programming via an "earthquake cart" and an outreach kit for school visits by museum education staff. The "earthquake cart" will be part of an existing gallery cart program at UMNH. The carts contain a variety of interactive activities and models designed to engage visitors in learning experiences beyond that provided by the exhibit.

The UMNH is looking forward to participating partnerships that contribute to earthquake literacy in the Intermountain West. For more information, please contact Dr. Paula Wilson at pwilson@umnh.utah.edu or call (801) 587-7769.

Utah Seismic Safety Commission

On Oct. 13, 2000, the Utah Seismic Safety Commission (USSC) held a regularly scheduled meeting at the State Office Building in Salt Lake City.

Barry Welliver, Structural Engineers Association of Utah, reported that a brochure on the existing parapet ordinance is available to educate building owners, public officials and others on requirements of the ordinance.

Richard Giraud from the Utah Geological Survey (UGS) explained the geologic hazard review process for new Utah schools. UGS reviews geologic reports for new schools and provides the school district and Utah State Office of Education pertinent information on the adequacy of the reports. UGS also performs preliminary site screenings for individual school districts.

Frank Ashland, UGS, proposed a seed-money program to be offered to students in secondary schools for the conducting of seismic safety research in Utah. The program would promote earthquake preparedness in the community, improve earthquake awareness statewide and create interest in earthquake-related careers. The intent is to encompass research in geosciences, land-use planning, community preparedness, architecture, engineering and governmental relations. Commission members unanimously agreed to allocate \$1000 annually.

Walter Arabasz, chair of the USSC, presented the commission with a draft progress report on improvements in earthquake safety in Utah from 1996-2000 that will be finalized and presented to the legislature later this year. This follows the legislature's request to provide periodical updates about the progress of loss reduction.



Calendar of Events

MARCH

19-22

Int'l Symposium on Deformation Measurements
Anaheim, CA

Info: www.pasadena.wr.usgs.gov/scign/fig/

21-23

Safety, Risk and Reliability-Trends in Engineering
Malta

Info: malta.2001@iabse.ethz.ch, www.iabse.ethz.ch/conferences/malta

26-31

4th Int'l Conference on Recent Advances in
Geotechnical Earthquake Engineering and Soil
Dynamics

San Diego, CA

Info: prakash@umr.edu

31-April 1

ASTM Symposium on Performance-Exterior Walls
Phoenix, AZ

Info: pjohnson@dt.smithgroup.com

APRIL

12-13

Geological Hazards of Utah Conference
Salt Lake City, UT

Info: www.users.qwest.net/~ssbartlett/geohazutah.htm

16-20

Conference on Civil Engineering in Asia
Tokyo, Japan

Info: www02.u-page.so-net.jp/tg7/cecar

18-20

SSA Annual Meeting
San Francisco, CA

Info: www.seismosoc.org/meetings/

21-25

2001 National Disaster Medical System Conference
Dallas, TX Adam's Mark Hotel

Info: ndms@usa.net, www.oep-ndms.dhhs.gov

MAY

21-23

ASCE Structures Congress 2001
Washington DC

Info: www.asce.org/conferences/structures-2001

JUNE

4-6

SEM Annual Conference
Portland, OR

Info: www.sem.org

12-14

IABSE Conference on Cable-Supported Bridges
Seoul, Korea

Info: secretariat@iabse.ethz.ch

17-22

ICOSSAR 2001
Newport Beach, CA

Info: www.colorado.edu/engineering/ICOSSAR

AUGUST

7-10

International Tsunami Symposium
Seattle, WA

Info: www.pmel.noaa.gov/its2001

12-17

SMiRT Conference
Washington DC

Info: www.engr.ncsu.edu/SMIRT_16

16-19

Int'l Conference on Engineering Materials
San Jose, CA

Info: mcmullin@email.sjsu.edu

29-31

IABSE Conference on Wooden Structures
Lahti, Finland

Info: www.iabse.ethz.ch



Utah Post-Earthquake Information Clearinghouse

Following a large earthquake, the knowledge and immediate post-earthquake observations of professionals including researchers, engineers, seismologists, geologists and seismic-safety representatives are valuable to emergency managers. If field observations are made available to emergency management officials, the response and recovery operation can be significantly enhanced.

The Northridge earthquake on January 17, 1994, marked the first attempt at joint operation of a post-earthquake information clearinghouse by professionals and emergency managers. The California Office of Emergency Services provided space in the Pasadena office for coordination, thus the first information clearinghouse was born. Following the Northridge earthquake, many

The Northridge earthquake on January 17, 1994 marked the first attempt at a joint operation.

professionals gathered every evening for several hours to discuss field observations. Gary Christenson, Utah Geological Survey, and Bob Carey, Utah Emergency

Management, were part of a Utah state team in Northridge that observed and participated in the Pasadena Clearinghouse.

During March 26-27, 2001, the Basin and Range Province Committee of the Western States Seismic Policy Council (WSSPC) and the Utah Seismic Safety Commission (USSC) will be co-sponsoring a workshop in Salt Lake City. The workshop will discuss the operation, issues and responsibilities of a state-run information clearinghouse. One main focus of the workshop is to produce a model clearinghouse plan that can be tailored to fit the needs of each state. A table-top exercise will be conducted at the end of the workshop to help identify any shortcomings in the draft clearinghouse plan. Participants of the workshop will include the WSSPC geosciences and emergency management delegates from each basin and range state and the USSC.

Contributed by Bob Carey

University cont.

The DRU Research and Development Project generates a national model that can be adapted and used by other institutions. The project has five major components: (1) hazard assessment and loss estimation; (2) evaluation of economic impacts; (3) development and implementation of a strategic risk management plan; (4) development of a model program for university disaster resistance; and (5) progress on national funding for hazards mitigation in



2001 National Disaster Medical System Conference

The 2001 National Disaster Medical System (NDMS) conference is designed to promote interaction between local, state and federal public health practitioners and policy makers. The conference targets the fields of clinical medicine, public health, emergency medical services, mental health, veterinary medicine, law enforcement, fire service, mortuary service, disaster response, emergency management and federal, state and local specialized response teams.

More than 75 accredited educational sessions will be held focusing on areas such as planning, health, medicine, counter-terrorism, tactical tools, mentoring and communication. Additionally, pre-conference workshops will also be held.

The conference will be held April 21-25 at Adam's Mark Hotel in Dallas, TX. For more information see www.oep-ndms.dhhs.gov, email ndms@usa.net or call NDMS at (800)USA-NDMS (then press the "star" key).

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